

# MULTIFUNCTIONAL RAIL-STYLE WALL COMBINED BY MORTISING

## BACKGROUND OF THE INVENTION

### 5 1. Field of the Invention

This invention relates to a multifunctional rail-style wall combined by mortising, particularly to one built of special cases and bricks with tenons and mortises engaged with one another, needless to employ  
10 mortar, slurry or other adhesives for bonding.

### 2. Description of the Prior Art

Although various new building materials have been employed for modern buildings nowadays, yet the cost of such materials are quite expensive. Therefore,  
15 conventional bricks are still employed in building so as to lower the cost of building materials, such as building surrounding walls or partitioning rooms.

However, walls built of the conventional bricks have the following defects.

20 1. When used for building walls, the conventional bricks must have the bonding portions applied with mortar first and then bonded together to be solidified. Under the circumstances, a great quantity of mortar which is a mixture of concrete, sand, stone and water has  
25 to be employed, and the concrete, the sand and the stone have to be obtained by exploiting natural environment, likely to spoil it.

2. During building walls with conventional bricks, mortar has to be mixed and stirred repeatedly for use, wasting time and labor, and bond the bricks together, each brick has to be applied with mortar continuously and bonded together quickly before the mortar becomes dry, complicating building process and requiring a long period of time in building.

3. Conventional bricks are heavy and have hardly any variation when used for building.

4. It is likely to soil and disorder nearby surroundings in the process of building.

#### SUMMARY OF THE INVENTION

A first objective of the invention is to offer a multifunctional rail-style wall combined by mortising. The wall is built of cases or bricks with tenons and mortises. The cases or the bricks with tenons and mortises used for building walls have the upper and the lower surface respectively formed with one or plural first tenons one or plural first mortises and at least one or plural second mortises. Thus, the cases or the bricks with tenons and mortises can be engaged with one another and combined into a straight wall or walls of other geometrical shapes, such as an L shape, a T shape, an inverted-U shape and a triangular shape, able to be assembled quickly and stably.

A second objective of the invention is to offer a multifunctional rail-style wall combined by mortising.

The wall is built of cases or bricks with tenons and mortises. Such cases and bricks respectively have one lengthwise side bored at an intermediate portion with a pipe groove preset in shape and four corners respectively formed with a cut face preset in shape. Thus, when such cases and bricks are connected straight vertically in an interposing pattern, the pipe grooves at the intermediate portions of the cases and the bricks will be aligned to the grooves formed by correspondingly combining every two cut faces of the upper and the lower cases and bricks so as to form a passageway for fitting pipes therein.

A third objective of the invention is to offer a multifunctional rail-style wall combined by mortising. The wall is built of cases and bricks with tenons and mortises. Such cases or bricks can be secured to an upper and a lower wall or fixed with a left and a right wall, letting the opposite first mortises of the cases or the bricks face each other at a certain distance. Then, a plate is slideably fitted between the opposite mortises to form a plate wall.

A fourth objective of the invention is to offer a multifunctional rail-style wall combined by mortising. The wall is built of hollow cases or solid bricks with tenons and mortises. The solid bricks with tenons and mortises can be combined as lower layers of a wall, while the hollow cases can be combined as upper layers

of the wall, and these hollow cases can be filled in with plastic materials to increase its strength.

A fifth objective of the invention is to offer a multifunctional rail-style wall combined by mortising.

5 The wall is built of cases or bricks with tenons and mortises. Such cases or bricks with tenons and mortises are made of special materials and have the following features: environmental protection, recyclability, fire prevention, water prevention, heat insulation,

10 temperature retaining, sound insulation, energy saving and extensive applicability.

#### BRIEF DESCRIPTION OF DRAWINGS

This invention will be better understood by referring to the accompanying drawings, wherein:

15 Fig. 1 is a perspective view of a first preferred embodiment of a hollow case with tenons and mortises in the present invention:

Fig. 2 is a perspective and cross-sectional view of the first preferred embodiment of the hollow case with

20 tenons and mortises in the present invention:

Fig. 3 is a perspective view of the first preferred embodiment of a brick with tenons and mortises in the present invention:

Fig. 4 is a front view of a straight wall built by

25 mortising together the cases or the bricks with tenons and mortises in the present invention:

Fig. 5 is a front view of the first preferred

embodiment of the hollow cases or the bricks with tenons and mortises, applied to a plate wall in the present invention:

Fig. 6 is a perspective view of a second preferred  
5 embodiment of the cases or the brick with tenons and mortises, used for building a vertical wall in the present invention:

Fig. 7 is a perspective view of the second  
preferred embodiment of cases or the bricks with tenons  
10 and mortises, combined into an L-shaped wall in the present invention:

Fig. 8 is a perspective view of a third preferred  
embodiment of the case or the solid brick with tenons  
and mortises, used for building a wall formed with a pipe  
15 groove in the present invention:

Fig. 9 is a front view of the third preferred  
embodiment of the cases or the bricks with tenons and  
mortises, combined into a wall having a pipe passage  
provided in advance for fitting pipes in the present  
20 invention:

Fig. 10 is a side-sectional view of a fourth  
preferred embodiment of the case or the brick with  
tenons and mortises to be fixed on an upper wall and on  
a floor in the present invention:

25 Fig. 11 is a side-sectional view of a fifth preferred  
embodiment of the case or the brick with tenons and  
mortises to be fixed under a roof and on the ground in

the present invention:

Fig. 12 is a perspective view of a sixth preferred embodiment of the case or the brick with tenons and mortises, used for increasing the thickness of a wall in  
5 the present invention:

Figs. 13 to 16 are respectively a side-sectional view of several other preferred embodiments of the case or the brick with tenons and mortises, having a flat surface to be used for closely contacting with a wall in  
10 the present invention: and

Figs. 17 to 19 are respectively a side-sectional view of the case or the brick with different-shaped tenons and mortises in the present invention.

#### 15 DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

A first preferred embodiment of a multifunctional rail-shape wall combined by mortising in the present invention, as shown in Figs. 1, 2 and 3, is a straight wall built of cases 1 or bricks 2 with tenons and mortises. The  
20 case 1 or the brick 2 is a rectangular body having an upper and a lower surface 10 and four vertical sides 20. Each case 1 or brick 2 has its upper surface 10 provided with two first tenons 11 and its lower surface 10 bored with two first mortises 12 respectively extending from  
25 the edge of one lateral side to the edge of the opposite lateral side to enable every two cases 1 or bricks 2 to be mortised together.

The cases 1 has its interior formed with a hollow portion 30 provided therein with a #-shaped or other shaped reinforcing ribs 31 on the inner walls to increase its strength and has its upper or lower surface bored with at least one pouring hole 14 communicating with the hollow 30. Thus, plastic materials can be poured into the hollow 30 through the pouring hole 14 and, after the plastic materials inside the hollow 30 is dried and hardened, solid cases with great strength are obtained, which are able to be used as the lowermost layer of a wall. The brick 2 with tenons and mortises is a solid one.

To build a straight wall with the cases 1 or the bricks 2 with tenons and mortises, as shown in Fig. 4, firstly, the cases 1 or the bricks 2 have their opposite short lateral sides connected with one another and arranged in one row or two rows and fixed on a floor to make up a lowermost layer of a wall. Next, the cases 1 or 1 or the bricks 2 for making up a second layer of the wall respectively have the two first mortises 12 engaged with the two first tenons 11 of the cases 1 or the bricks 2 of the lowermost layer on the floor to finish the second layer of the wall, with the cases 1 or the bricks 2 of the second layer positioned on those of the lowermost layer in an interposing pattern. A third layer or other sequent layers of the wall are positioned in the same way as described above.

In case the cases 1 or the bricks 2 with tenons and

mortises of this invention are used to build a straight wall connected under a roof and on the ground, the roof and the ground have to be respectively provided with two elongate projections or two elongate grooves to be  
5 respectively mortised with the two first mortises 12 or the two first tenons 11 of the cases 1 or the bricks 2 to finish the lowermost and the uppermost layer of a wall. In addition, the cases 1 or the bricks 2 can also be arranged alongside into a straight line and have their  
10 upper surfaces 10 with the first tenons 11 respectively fixed under the roof and on the ground, with their first mortises facing each other. Then, a plate 40 is slidably fitted with the opposite mortises 12 of the cases 1 or the bricks 2 fixed under the roof and on the ground, thus  
15 finishing assembly of a plate wall. In addition, a plate can also be movably between a left and a right wall formed of the cases 1 and the bricks 2. .

The plate 40 employed in the invention is made of black mica, which has capacities of fire prevention,  
20 temperature retaining, heat insulation and sound insulation. The mica is processed, treated and added with other minerals and chemical materials to make a multifunctional plate which is able to take the place of stone, earthenware grains and slag, having many features,  
25 such as high technology, environmental protection, recyclability, fire prevention, water prevention, heat insulation, temperature retaining, sound insulation,



energy saving and extensive application. In addition, the case 1 and the brick 2 can be made of the cut waste of the plate 40 added with a proper proportion of mineral, wood, plastic and metal compressed by machinery, having  
5 advantage of environmental protection.

A second preferred embodiment of a multifunctional rail-style wall combined by mortising in the present invention is a vertical wall built of the cases 1 or the bricks 2. For building a vertical wall, as shown  
10 in Fig. 6, the case 1 or the brick 2 with tenons and mortises 2 has its lower surface 10 with the two first mortises 12 bored at one end with two transverse second mortises 13 perpendicular to the two first mortises 12.

As shown in Fig.7, the cases 1 or the bricks 2 can  
15 be vertically arranged into an L-shaped, a T-shaped or an inverted U-shaped wall. In assembling, firstly, the cases 1 or the bricks 2 of the lowermost layer of a first wall (a) are vertically connected alongside with the cases 1 or the bricks 2 of the lowermost layer of a second wall (b).  
20 Then, the cases 1 or the brick 2 to form a second layer of the second wall (b) have the two first tenons 11 on the lower surface 10 respectively engaged vertically with the two second mortises 13 in the upper surface 10 of the cases 1 or the bricks 2 of the lowermost layer of the wall  
25 (a). Thus, walls of different shapes can be built with the cases 1 or the bricks 2 in a same way as described above.

A third preferred embodiment of a multifunctional

5 rail-style wall combined by mortising in the present invention, as shown in Fig. 8, has passageways formed for fitting pipes therein. For this purpose, as shown in Fig. 8, the cases 1 or the brick 2 with tenons and  
10 mortises used for building a straight or a vertical wall has one lengthwise side 20 bored with a vertical pipe groove 21 at an intermediate portion and the four corners of the four vertical sides 20 are respectively formed with a cut face 22. Thus, when the cases 1 or the bricks 2 are  
15 upward positioned in an interposing pattern, the pipe grooves 21 at the intermediate portions of the cases 1 or the bricks 2 will be aligned to the notches formed by the two cut faces 22 of two connected cases 1 or bricks 2 to form a piping passage, as shown in Fig. 9. Therefore,  
20 when a wall is built of such cases 1 or bricks 2, a continuous pipe passageway 23 can be formed for facilitating installation of wire or water pipes 50. An open pipe passageway 23 will be formed in case the wall has a thickness of only one row of such cases 1 or bricks  
25 2, while a closed pipe passageway 23 can be formed when the wall is built with a thickness of two rows of such cases 1 or bricks 2 having the pipe passageways 23 facing each other, able to quickly install pipes through the pipe passageway 23 and impossible to spoil or damage the wall.

A fourth and a fifth preferred embodiment of a multifunctional rail-style wall combined by mortising in

the present invention is to be fixed under a roof or on the ground. For this purpose, as shown in Figs. 10 and 11, the case 1 or the brick 2 has the the portions of the two lengthwise sides near the upper or lower surface 10  
5 respectively provided with a wing 24 extending out horizontally, and each wing 24 is bored with an insert hole 241 for an expansion bolt to be inserted therethrough and secure the cases 1 or the brick 2 on the ground or the upper wall.

10 A sixth preferred embodiment of a multifunctional rail-style wall combined by mortising in the present invention is a thick wall combined with two rows of the cases 1 or the bricks 2. For building such a wall, as shown in Fig. 12, the case 1 or the brick 2 has one  
15 lengthwise side 20 provided with two vertical tenons 25 spaced apart and the other lengthwise side formed with two vertical mortises 26 spaced apart to correspond to the two tenons 25, with the two vertical tenons 25 and the two vertical mortises 26 respectively extending from  
20 the edge of the upper surface 10 to the edge of the lower surface 10. Thus, one case 1 or brick 2 can be combined alongside with another case 1 or brick 2 by engaging the two vertical tenons 25 with the two vertical mortises 26 together.

25 Several other preferred embodiments of a multifunctional rail-style wall combined by mortising in the present invention are to be contacted closely with

surrounding walls of a building. For this purpose, as shown in Figs. 13 to 16, the case 1 or the brick 2 has one of the two surfaces 10 or one of the two lengthwise sides formed into a flat surface to be closely and smoothly  
5 connected with a surrounding wall.

In addition, the tenons 11 and the mortises 12 of the cases 1 or the bricks 2 in this invention can be of any shape or of any size so long as they can be engaged correspondingly with one another. For instance, the  
10 shapes of the tenon 11 and the mortises 12 cloud be shaped a "V" as shown in Figs. 1 to 16, or a "U", a semicircle, or "Ω".

Specifically, the feature and variation of this invention are described as follows.

15 1. The case 1 or the brick 2 with tenons 11 and mortises 12 can be a rectangular shape or any other geometrical shapes.

2. The cases 1 or the brick 2 can be provided with one, or two or more than two tenons 11 and mortises 12.

20 3. The cases 1 or the bricks 2 with different numbers of tenons 11 and mortises 12 can be reciprocally combined together for use according to practical needs.

4. The tenons 11 and the mortises 12 of the cases 1 or the brick 2 can be shaped into any geometrical shape,  
25 such as a "V", a "U", a semicircle, or a "Ω" shape.

5. The tenons 11 and the mortises 12 of the case 1 or the brick 2 can be formed either on the upper and the

lower surface or on the two lengthwise sides.

6. The size of the case 1 or the brick 2 with tenons 11 and mortises 12 can be changed in accordance with the requirements of customers.

5         7. The pipe groove 21 formed in the cases 1 or the bricks 2 can be of any geometrical shape.

8. Pipes can in advance be installed in the pipe groove 21 formed in the cases 1 or the bricks 2. If the cases 1 or the bricks 2 are hollow, pipes can be installed  
10 in the hollow interior.

9. The hollow portion of the case 1 with tenons 11 and mortises 12 can be filled in with liquid mortar or other materials and can be provided therein ribs made of plates, plastic or metal to increase its strength.

15         10. Any part of the case 1 with tenons 11 and mortises 12 can be made with plastic or metal for use.

11. The cases 1 or the bricks 2 with tenons 11 and mortises 12 can be cast integral casting in certain factories or any particular site.

20         12. The cases 1 or the bricks 2 with tenons 11 and mortises 12 can quickly be combined into a wall shaped "L", "T" or inverted-U.

13. The cases 1 or the bricks 2 with tenons 11 and mortises 12 can be used as inner or outer molds.

25         14. An outer wall built of the cases 1 or the bricks 2 with tenons 11 and mortises 12 can be attached on with mosaic, marble, ore, or metal, or coated with color paint,

wall paper or drawn with drawings to beautify its appearance.

15        15. The cases 1 or the bricks 2 with tenons 11 and mortises 12 can be combined into an everlasting wall or a temporary wall.

16. The cases 1 or the bricks with tenons 11 and mortises 12 can be recycled for reuse.

10        17. A wall built of the cases 1 or the bricks 2 with tenons 11 and mortises 12 can be extended or shortened or connected with another wall.

18. All the parts and fittings for making up the cases 1 with tenons 11 and mortises 12 can be recombined into cases with tenons and mortises by buyers themselves and then combine them into a wall.

15        19. The cases 1 or the bricks 2 with tenons 11 and mortises 12 can be reciprocally used for building walls according to practical needs.

20        20. The cases 1 or the bricks 2 with tenons 11 and mortises 12 can be combined into walls of different shapes without help of professional workers.

21. The cases 1 or the bricks 2 can be combined into walls conveniently and quickly.

25        22. It is unnecessary to employ other tools for combining the cases 11 or the bricks 2 into walls and impossible to cause pollution.

As can be understood from the above description, the cases 1 or the bricks 2 with tenons 11 and mortises 12

can be shaped into various structures and also can be combined with plates to build walls of different shapes as described below.

1. Walls can be built only with the hollow cases 1  
5 with tenons and mortises.

2. Walls can be built of the hollow cases 1 with tenons and mortises, which are respectively provided therein with reinforced ribs or filled with mortar.

3. Walls can be built with plates 40 and the bricks  
10 2 with tenons and mortises.

4. Walls can be built of both the cases 1 and the bricks 2 with tenons and mortises.

5. Walls can be built of plates 40, and cases 1 and bricks 2 with tenons and mortises.

15 Further, the combination of the cases 1, or of the cases 1 with the bricks 2, or of the bricks 2 can be carried out by mutual engagement of the tenons with the mortises so it is needless to employ traditional mortar, slurry or other adhesive media for bonding, able to  
20 combine a wall easily and quickly.

Furthermore, the cases 1 and bricks 2 with tenons and mortises in the present invention are derived and developed from the following PRC patents acquired by the inventor of this invention: No. 02289540.X titled  
25 "STONE MATERIAL OF HEALTH AND ENVIRONMENTAL PROTECTION", No. 02294519.9 titled "POROUS ECOLOGICAL PLATE" and the patent No.

02289539.6 titled "FIREPROOF, WATERPROOF, HEAT-INSULATING AND SOUND-INSULATING WALL PLATE". The case 1 with tenons and mortises in this invention is made of black mica, which is cut and assembled, while the bricks 2 with tenons and mortises in this invention are made of the recycled waste material of foresaid plate, which is crushed and then added with other material. In addition, the case 1 and the bricks 2 with tenons and mortises in this invention can also be made of material of mining products or waste materials obtained from cement factories. To sum up, the case 1 and the bricks 2 with tenons and mortises in the present invention not only have advantages of high technology, environmental protection, and no-pollution, but also have effects of fire prevention, water prevention, heat insulation, sound insulation and temperature retaining.

While the preferred embodiments of the invention have been described above, it will be recognized and understood that various modifications may be made therein and the appended claims are intended to cover all such modifications that may fall within the spirit and scope of the invention.